COMPUTER APPARATUS AND METHOD FOR AUTONOMICALLY DETECTING
SYSTEM RECONFIGURATION AND MAINTAINING PERSISTENT I/O BUS
NUMBERING
BAILEY ET AL.
DOCKET NO. ROC920030218US1
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100

Tower A NVRAM 122

CEC S/N = 1
CEC Type = X
First Bus Num = 1
Num Buses = 3

Tower B NVRAM 132

CEC S/N = 1
CEC Type = X
First Bus Num = 4
Num Buses = 3

0   Tower A   1

120

0   Tower B

130   1

0

CEC

110   1

CEC NVRAM 112

CEC S/N = 1
CEC Type = X
Bus Num Mask =
0111 1111 1111 0000

1   Tower D   0

150

0

1   Tower C

140

Tower D NVRAM 152

CEC S/N = 1
CEC Type = X
First Bus Num = 10
Num Buses = 2

Tower C NVRAM 142

CEC S/N = 1
CEC Type = X
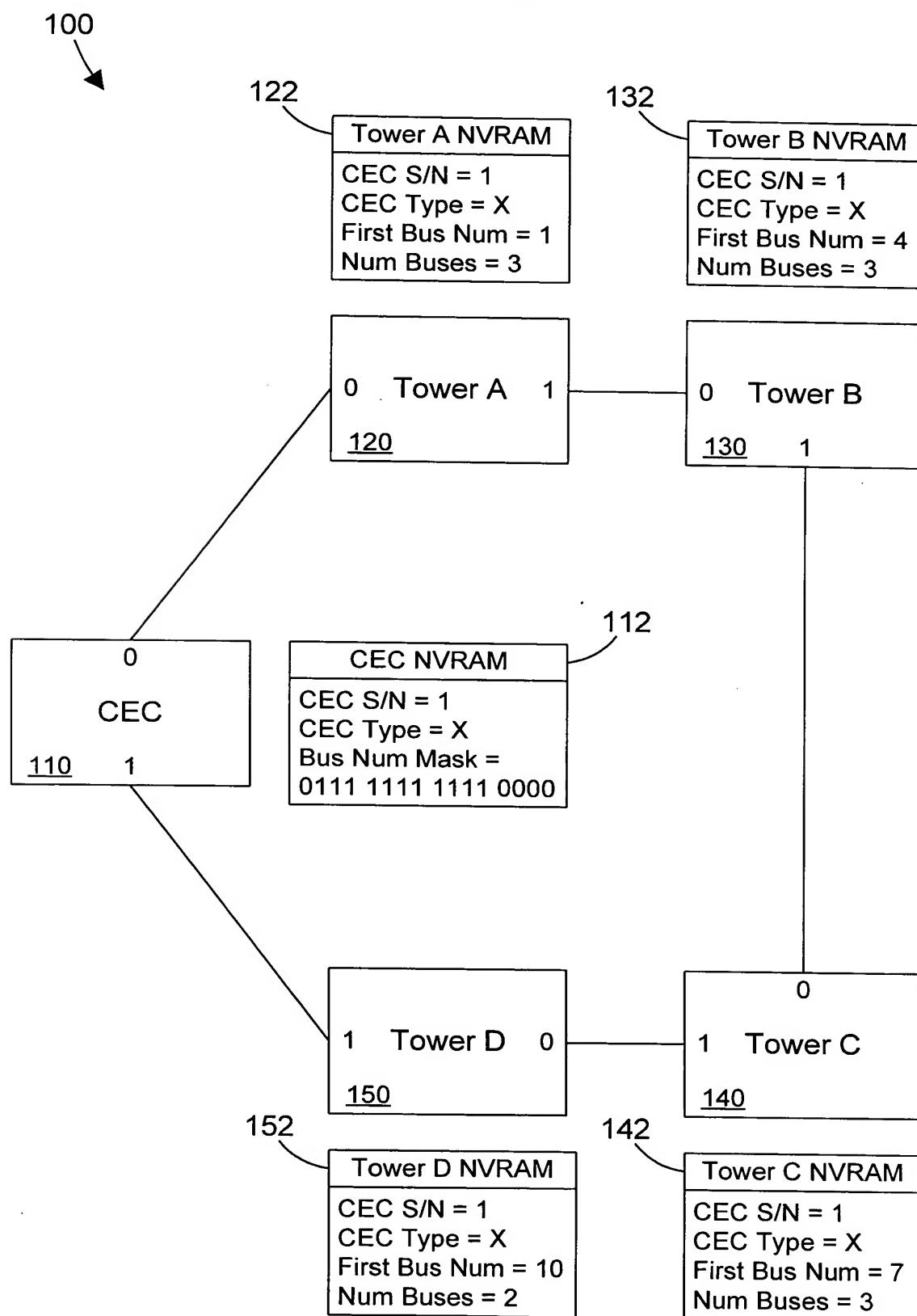First Bus Num = 7
Num Buses = 3

FIG. 1   Prior Art

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FIG. 2   Prior Art

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100

122

Tower A NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 1
Num Buses = 3

132

Tower B NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 4
Num Buses = 3

0   Tower A   1

120

0   Tower B

130   1

0

CEC

110   1

112

CEC NVRAM

CEC S/N = 1
CEC Type = X
Bus Num Mask =
0111 1111 1111 0000

0

1   Tower D   0

150

1   Tower C

140

152

Tower D NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 10
Num Buses = 2

142

Tower C NVRAM

CEC S/N = 0
CEC Type = 0
First Bus Num = 0
Num Buses = 0

FIG. 3   Prior Art

COMPUTER APPARATUS AND METHOD FOR AUTONOMICALLY DETECTING
SYSTEM RECONFIGURATION AND MAINTAINING PERSISTENT I/O BUS
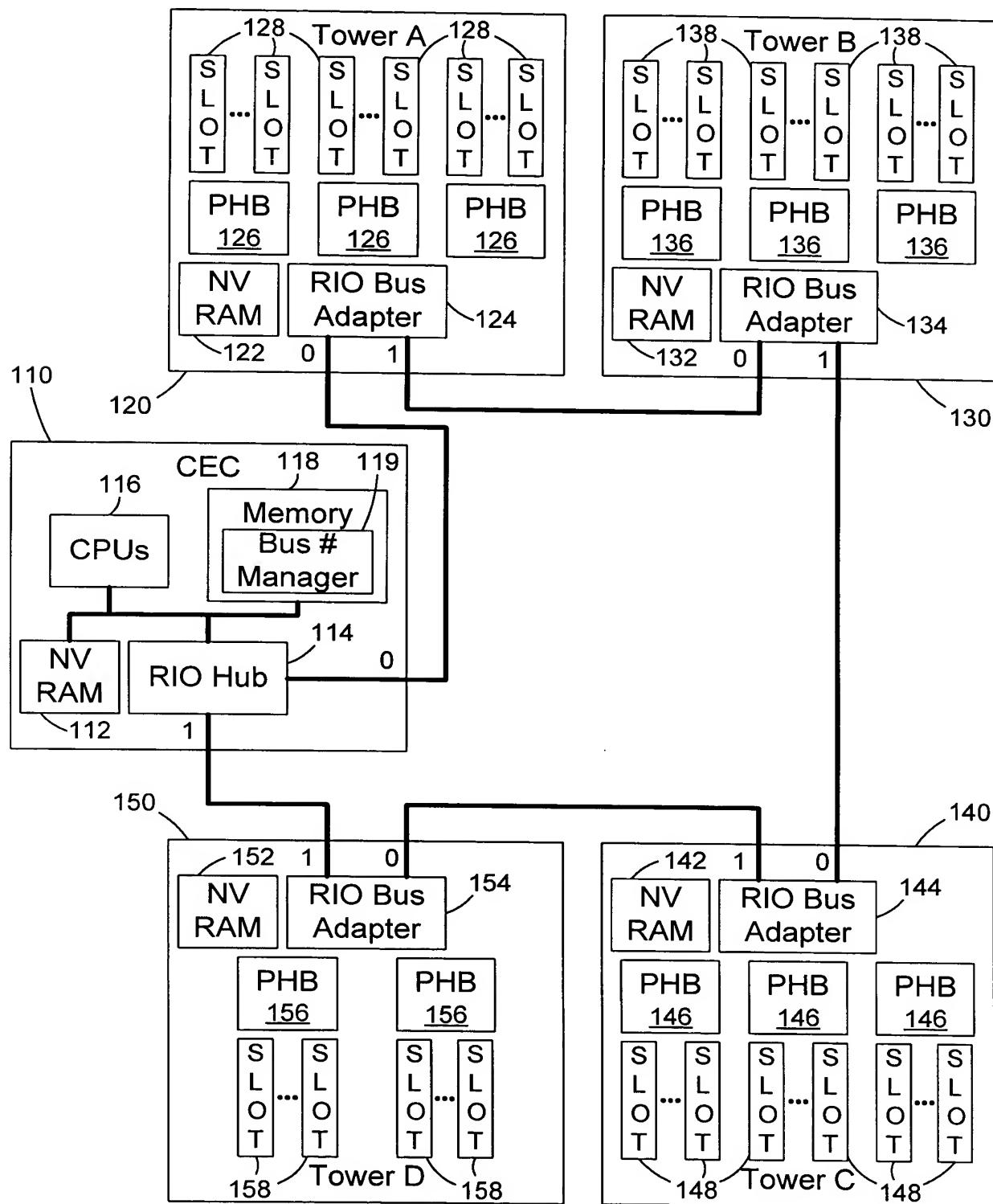NUMBERING
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400

Start - Initial Program Load

Select a Tower — 410

Read NV Memory from Selected Tower — 420

430
NV Memory Valid?

YES

440
Assign Buses in Tower
Bus Numbers Stored in
NV Memory

NO

Determine from Bus Num Mask in CEC
which Bus Mumbers are in Use — 450

Assign Buses in Tower Next Available
Bus Numbers — 460

Update Bus Number Mask in CEC — 470

480
More Towers?

YES

NO

Done

FIG. 4   Prior Art

COMPUTER APPARATUS AND METHOD FOR AUTONOMICALLY DETECTING
SYSTEM RECONFIGURATION AND MAINTAINING PERSISTENT I/O BUS
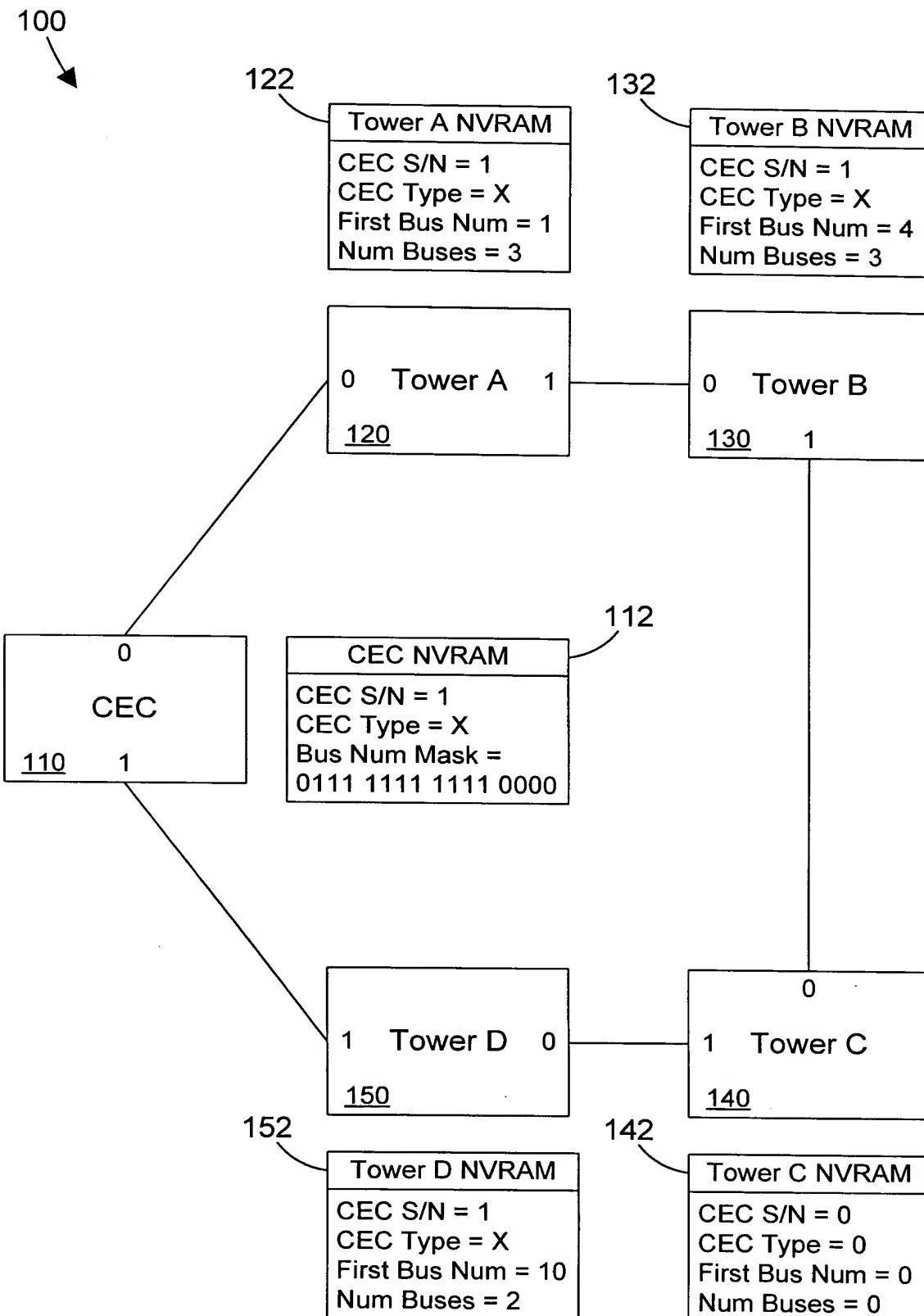NUMBERING
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122

Tower A NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 1
Num Buses = 3

132

Tower B NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 4
Num Buses = 3

0   Tower A   1
120

0   Tower B
130   1

112

CEC NVRAM
CEC S/N = 1
CEC Type = X
Bus Num Mask =
0111 1111 1111 1110

0
CEC
110   1

1   Tower D   0
150

0
1   Tower C
140

152

Tower D NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 10
Num Buses = 2

142

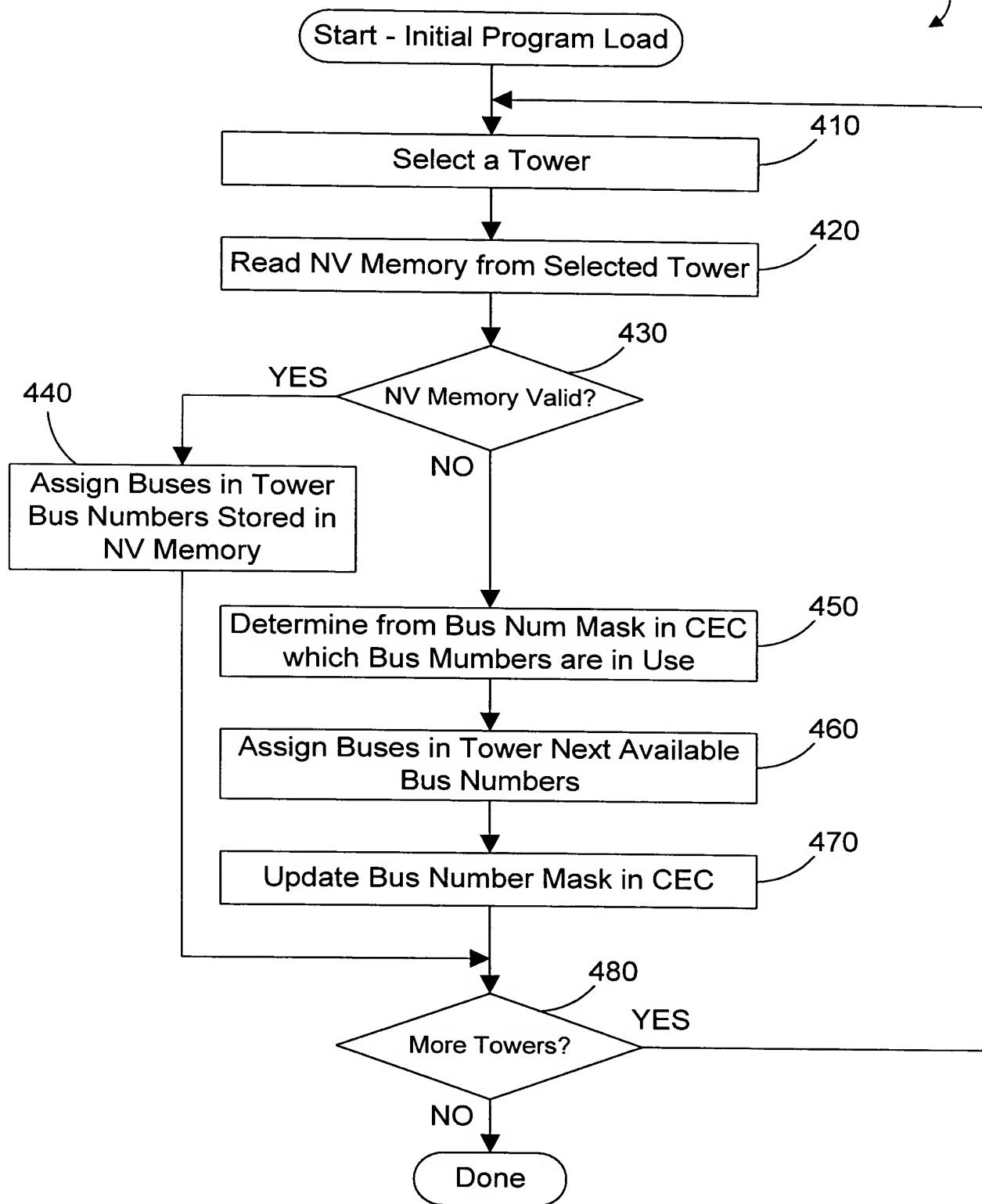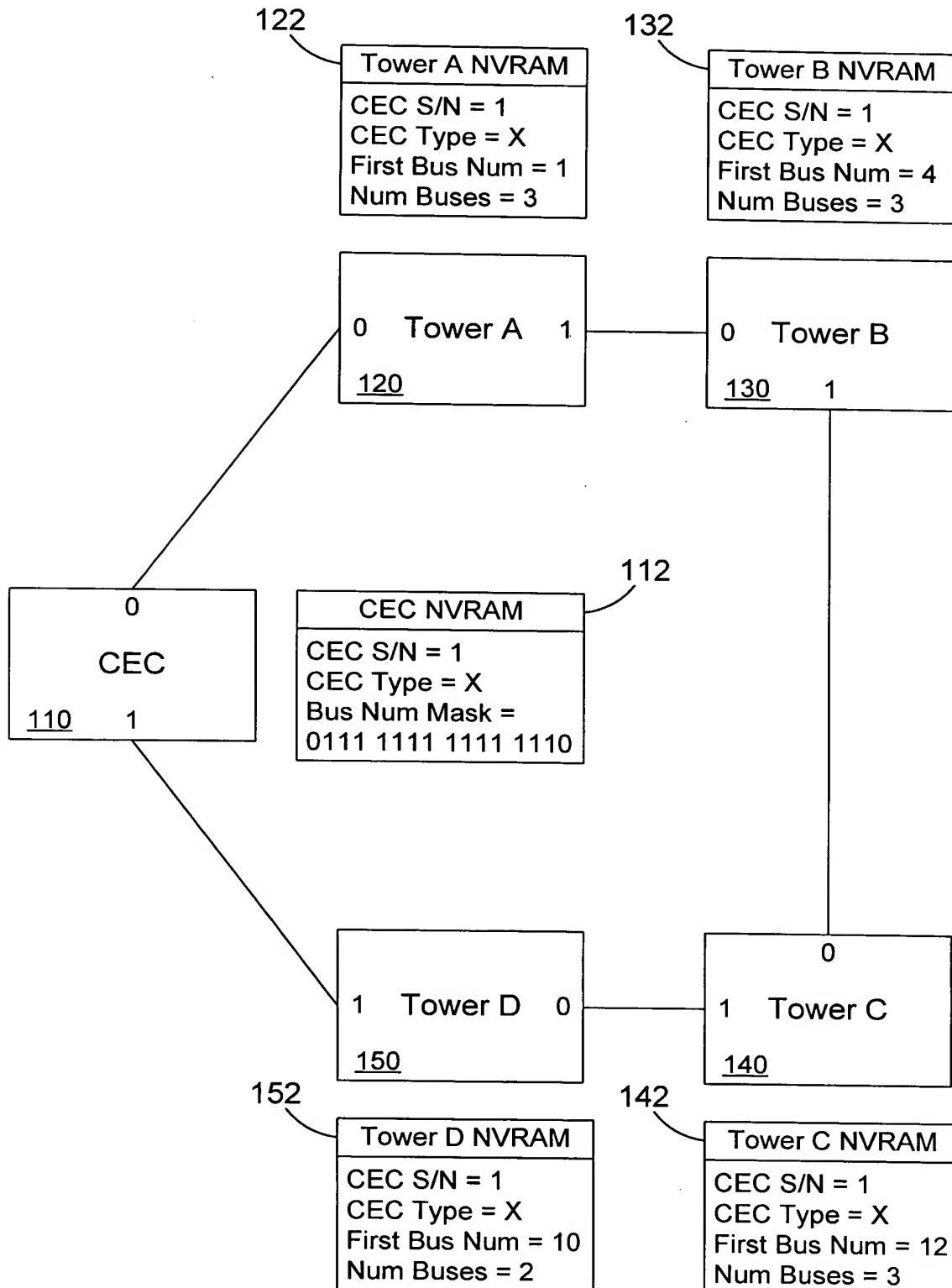| Tower C NVRAM |
|---|
| CEC S/N = 1 |
| CEC Type = X |
| First Bus Num = 12 |
| Num Buses = 3 |

FIG. 5   Prior Art

COMPUTER APPARATUS AND METHOD FOR AUTONOMICALLY DETECTING
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622

Tower A NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 1
Num Buses = 3
P0 Bus Num = 10
P0 Num Buses = 2
P1 Bus Num = 4
P1 Num Buses = 3

632

Tower B NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 4
Num Buses = 3
P0 Bus Num = 1
P0 Num Buses = 3
P1 Bus Num = 7
P1 Num Buses = 3

600

| 0 | Tower A | 1 |
| | 620 | |

| 0 | Tower B | |
| | 630 | 1 |

| 0 |
| CEC |
| 110 | 1 |

112

CEC NVRAM

CEC S/N = 1
CEC Type = X
Bus Num Mask =
0111 1111 1111 0000

FIG. 6

| 1 | Tower D | 0 |
| | 650 | |

	0	
1	Tower C	
	640	

652

Tower D NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 10
Num Buses = 2
P0 Bus Num = 7
P0 Num Buses = 3
P1 Bus Num = 1
P1 Num Buses = 3

642

Tower C NVRAM

CEC S/N = 1
CEC Type = X
First Bus Num = 7
Num Buses = 3
P0 Bus Num = 4
P0 Num Buses = 3
P1 Bus Num = 10
P1 Num Buses = 2

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600

622 — Tower A NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 1
Num Buses = 3
P0 Bus Num = 10
P0 Num Buses = 2
P1 Bus Num = 4
P1 Num Buses = 3

632 — Tower B NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 4
Num Buses = 3
P0 Bus Num = 1
P0 Num Buses = 3
P1 Bus Num = 7
P1 Num Buses = 3

0   Tower A   1
620

0   Tower B
630   1

0
CEC
110   1

112 — CEC NVRAM
CEC S/N = 1
CEC Type = X
Bus Num Mask =
0111 1111 1111 0000

FIG. 7

1   Tower D   0
650

0
1   Tower C
640

652 — Tower D NVRAM
CEC S/N = 1
CEC Type = X
First Bus Num = 10
Num Buses = 2
P0 Bus Num = 7
P0 Num Buses = 3
P1 Bus Num = 1
P1 Num Buses = 3

642 — Tower C NVRAM
CEC S/N = 0
CEC Type = 0
First Bus Num = 0
Num Buses = 0
P0 Bus Num = 0
P0 Num Buses = 0
P1 Bus Num = 0
P1 Num Buses = 0

COMPUTER APPARATUS AND METHOD FOR AUTONOMICALLY DETECTING
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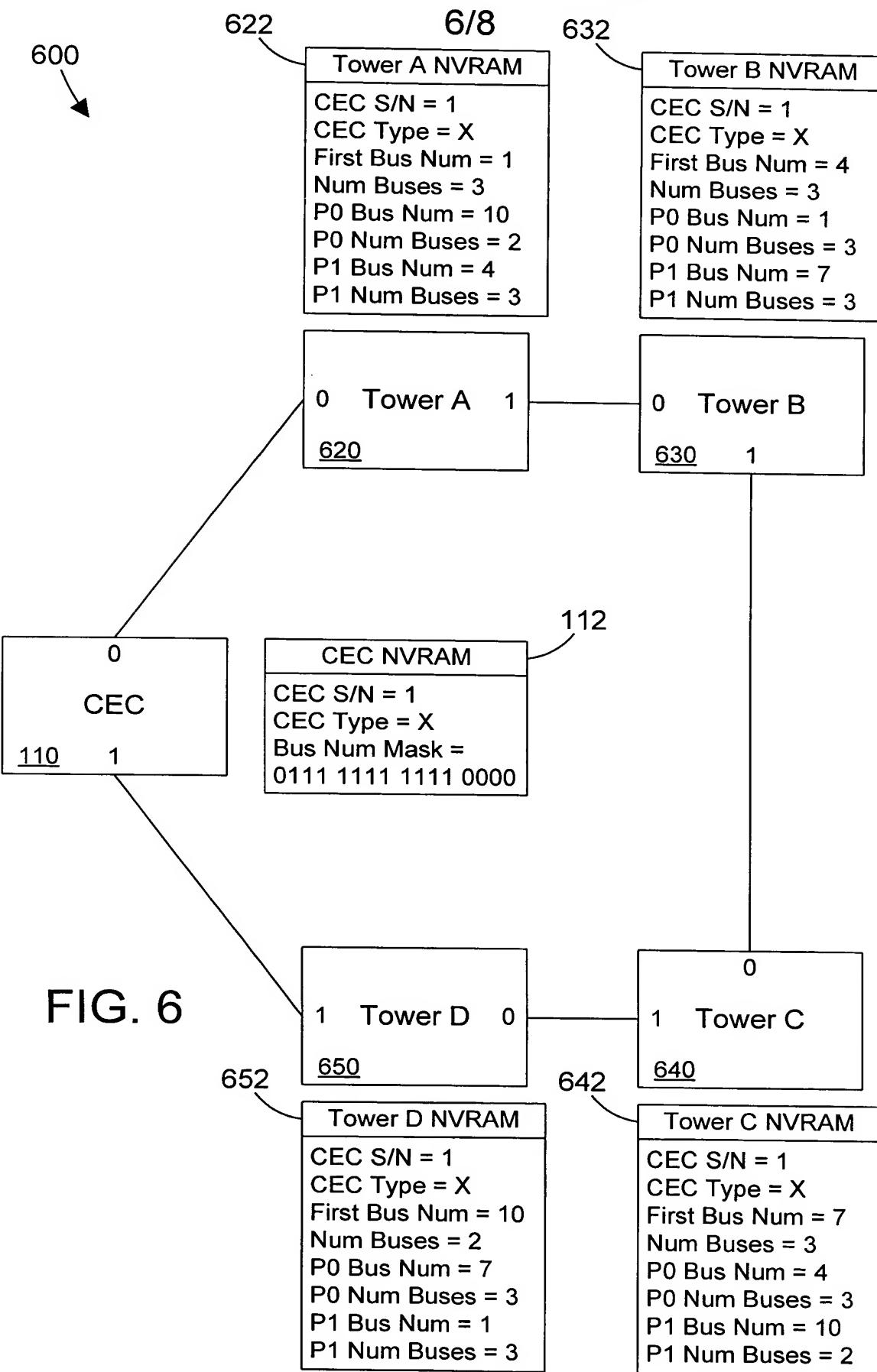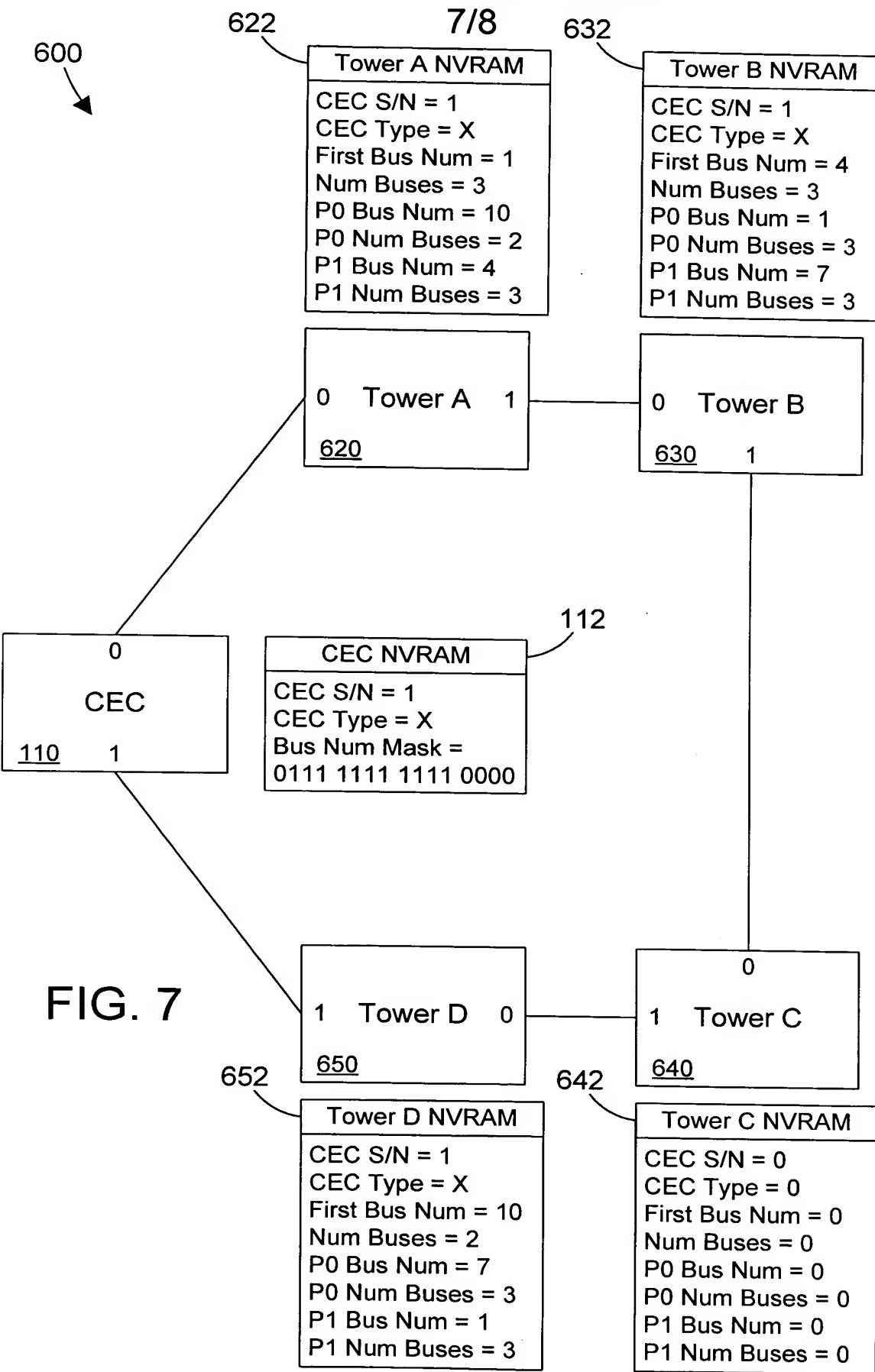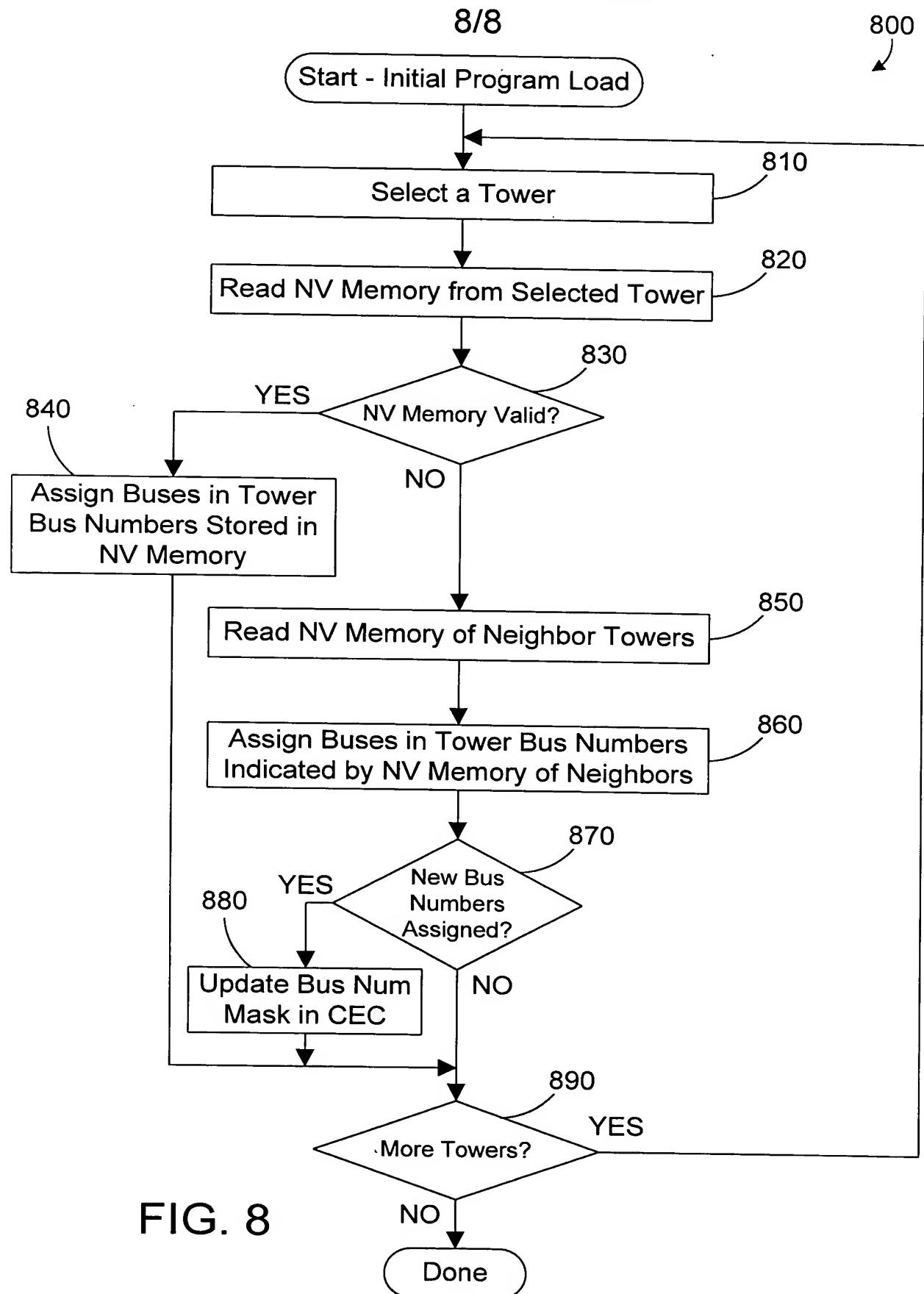NUMBERING
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800

```
        ( Start - Initial Program Load )
                      |
                      v
        +-------------------------------+   810
        |        Select a Tower         |
        +-------------------------------+
                      |
                      v
        +-------------------------------+   820
        | Read NV Memory from Selected Tower |
        +-------------------------------+
                      |
                      v
          YES     < NV Memory Valid? >   830
       +----------      |
       |               NO
       v                |
  +----------------+    |
  | Assign Buses in|    |
  | Tower Bus      |    |
  | Numbers Stored |    |
  | in NV Memory   |    |     840
  +----------------+    |
       |                v
       |      +-------------------------------+   850
       |      | Read NV Memory of Neighbor Towers |
       |      +-------------------------------+
       |                |
       |                v
       |      +-------------------------------+   860
       |      | Assign Buses in Tower Bus     |
       |      | Numbers Indicated by NV       |
       |      | Memory of Neighbors           |
       |      +-------------------------------+
       |                |
       |                v
       |   YES   < New Bus Numbers Assigned? >   870
       |  +-------       |
       |  |             NO
       |  v              |
       | +-------------+ |     880
       | | Update Bus  | |
       | | Num Mask    | |
       | | in CEC      | |
       | +-------------+ |
       |       |         |
       +-------+---------+
                |
                v
         < More Towers? >   890     YES
                |
               NO
                v
            ( Done )
```

FIG. 8